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nerves for the secretory glands has been made more probable by Pawlow. The true significance of this discovery lies in the fact that it has enabled us to appreciate more clearly the mechanism by which the secretory glands, like other organs, adapt themselves so perfectly to the work which they have to accomplish at different times.

With pure digestive juices made thus readily available, it is not surprising to find interest in the study of their composition renewed. The way has been opened for more purely chemical investigations, such as the recent one of Professor v. Nencki—a colleague of Professor Pawlow—on the character of the enzymes of the gastric juice. From the general biological point of view, one of the most interesting aspects of the work of the St. Petersburg school is the demonstration of the purposeful character of secretion into the alimentary canal. Quantitatively and qualitatively the work of the glands varies with the character of the substances upon which they exert their action at different times. Changes in diet bring variations in the character of secretion. Pawlow has broadly expressed this view in summarizing his contributions to our knowledge of the specific excitability of the digestive glands. He writes: "Our results have, we trust, dispelled from our domain, once for all, the unfruitful idea that the alimentary canal is excitable by any agent whatsoever, mechanical, chemical or thermal, without regard to the peculiarity of each specific digestive task. At present, agencies such as these, vigorously applied, must be regarded merely as favoring or inhibitory influences, not as the normal and determining factors which excite secretory activity. In place of gross uncertainty (*Scheinwissen*) we now see the outlines of an artistic mechanism which, like everything that we understand in nature, exhibits an unusual degree of exactness and utility in her processes."

It remains to speak of Pawlow's work (in cooperation with v. Nencki and others) on the functions of the liver. Here again a brilliant operative technique—the Eck fistula, by which the portal blood is diverted directly into the vena cava without entering the hepatic capillaries—has inaugurated progress. The splendid researches on the seat of urea formation in mammals have modified and shaped the current teaching of this subject and other aspects of intermediary metabolism. What light they may throw upon the pathogeny of certain abnormal states, such as uræmia and diabetes, can scarcely be foretold.

Among the comparatively recent contributions to physiological literature no book has exerted a more stimulating influence than Pawlow's '*Die Arbeit der Verdauungsdrüsen*' (J. F. Bergmann, Wiesbaden, 1898). It summarizes in suggestive chapters the main achievements of the author in his chosen field of work. Its original treatment of the problems in this domain has aroused the interest of both physiologists and physicians; and the work has already served in fulfilment of the author's hope, to further physiological science by promoting a more active interchange of ideas between the practitioner and the laboratory worker. Pawlow's work has demonstrated what Sir Michael Foster has written in another connection: that "the heart of physiology is in the laboratory. It is this which sends the life-blood through its frame; and in respect to this, perhaps, more than anything else, has the progress of the past years been striking."

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#### SCIENTIFIC BOOKS.

*Report of the Sanitary Investigations of the Illinois River and its Tributaries.* The Illinois State Board of Health, 1901.

The self-purification of streams has been for many years a perennial subject of discussion among sanitarians. Early faith in the power of running water to purify itself was severely shaken by the advent of the science of bacteriology, and the postulate that 'no river was long enough to purify itself' was accepted by many as representing the ultimate conclusion of science upon the subject. Recently data have been accumulating in the opposite direction and apparently indicate that under certain conditions streams do tend to become purer as they flow. A notable instance of this may be found in a report just issued by the Illinois State Board of Health on the Sanitary Investigations of the Illinois River and its Tributaries, with special reference to the effect of the sewage of Chicago on the Des Plaines and Illinois rivers prior to and after the opening of the Chicago drainage canal.

Advance notes upon the same subject, issued in 1900, gave the results of chemical and bacteriological examinations of samples of water at various points on these streams between Chicago and the Mississippi made during the summer and autumn of 1899, before the opening of the drainage canal. The present report gives, in addition to the figures then obtained, the results of further examinations made in 1900 with the drainage canal in use. The work was conducted by the State Board of Health, under the direction of Dr. John H. Long, professor of chemistry, Northwestern University Medical School, and Mr. Jacob A. Harman, civil engineer, of Peoria. Dr. Long was assisted in the qualitative bacteriological work by Professors F. Robert Zeit and Gustav Fütterer, of the Northwestern University Medical School. The reports of these gentlemen are prefaced by an introductory chapter of thirty-four pages by Dr. James A. Egan, secretary of the Illinois State Board of Health, upon the 'Pollution of the Illinois River as affected by the Drainage of Chicago and other Cities.' This contains a historical sketch of early investigations of the river, a compilation of various opinions upon the self-purification of streams and a summary of the results obtained by the recent investigations.

Dr. Long's report of the chemical and

bacteriological examinations occupies seventy-seven pages and that of Mr. Harman, entitled 'A Preliminary Sanitary Survey of the Illinois River Drainage Basin,' one hundred and five pages. They include tables showing population, rainfall, stream gaugings, water-supply and sewerage statistics, analyses, etc. The brief report by Professors Zeit and Fütterer describes the various species of bacteria found at each station, with special reference to their pathogenic qualities.

The most interesting feature of the report is naturally the comparison of the condition of the Illinois River before and after the opening of the Chicago drainage canal. In order to appreciate this a knowledge of the local conditions is necessary. For many years the bulk of the sewage of Chicago has discharged into the Chicago River, a small stream with north and south branches uniting in the heart of the city to flow into Lake Michigan. This has been a menace to the public water supply, which is taken from the lake, and in order to lessen the danger a pumping station was established at Bridgeport in 1865, by which the water from the polluted south branch was pumped into the Illinois and Michigan canal, whence it found its way westward into the Illinois and Mississippi Rivers. This not being sufficient to relieve the situation in Chicago a drainage canal was designed to connect the Chicago River with the Des Plaines River, which is one of the streams which unite to form the Illinois River. A western outlet to Lake Michigan was thus provided, which naturally changed the current in the Chicago River. After ten years of construction the canal was opened on January 17, 1900. Prior to this from 30,000 to 50,000 cubic feet per minute was pumped at Bridgeport, and it has been estimated that in 1899 this contained from 85 to 90 per cent. of the total sewage of Chicago. Since the opening of the canal the actual amount of sewage sent westward has increased, but the amount of water has increased in a far greater ratio, the law requiring a minimum flow in the canal of 300,000 cubic feet per minute. According to Dr. Long's report the increased dilution thus brought about has resulted in an improved condition of the sanitary quality of the water in the Illinois

River. The analyses upon which this opinion is based are too extensive to reproduce here, but those who dwell in the lower Illinois valley and those who have feared the possible effect of the sewage of Chicago upon the water supply of St. Louis should observe the following emphatic statement of Dr. Long: He says: "I believe that it may be safely said that if the whole of the sewage of Chicago were to be excluded from the Illinois River, the condition at Grafton (where it enters the Mississippi) would remain unchanged so far as its organic contents and bacterial organisms are concerned."

The character of the Chicago sewage, the condition of the various tributary streams, the self-purification of the Illinois River and its subsequent pollution by Peoria and other cities are all fully discussed in the report.

The analytical work appears to have been carefully done, but it is to be regretted that certain portions of what is now considered to be a complete water analysis are omitted. For example, the amount of coloring matter was not measured and consequently the determination of oxygen consumed cannot be fully interpreted. The measurement of turbidity was likewise omitted; nor is any mention made of microscopical examinations. Determinations of dissolved oxygen and free carbonic acid, taken in connection with the other observations, would have thrown much light upon the self-purification of the stream. Nevertheless, the results as they stand are of great value and reflect credit upon those who conducted the work.

It is the intention of the Illinois State Board of Health to extend observations of this character to other streams until the sanitary survey of the state shall be complete.

G. C. WHIPPLE.

*Leifaden der Wetterkunde.* Gemeinverständlich bearbeitet von DR. R. BORESTEIN. Mit 52 in den Text eingedruckten Abbildungen und 17 Tafeln. Braunschweig, Friedrich Vieweg und Sohn, publishers. 1901. Price, 6 Mk.

This book is intended as a popular treatise on the weather, for the use of farmers, sailors and others whose pursuits are affected by the weather, and also for the benefit of all who

may be interested in natural phenomena. Its object is to give the elementary facts of meteorology and explain the scientific principles on which weather forecasts are made. The author hopes thus to enable his readers to better understand and apply the forecasts as made by the national bureaus and to make forecasts for themselves. The publishers explain that among other new things embodied in the book are the results of the scientific balloon ascents and an account of the various weather services of the world.

The book is interestingly written and well illustrated. The distribution of rainfall and temperature over Europe is graphically illustrated by four colored charts. Perhaps the most attractive feature in the book is the reproduction of the best of the pictures from the International Cloud Atlas, showing in approximately natural colors the different types of clouds, all of which are derived from photographs. This is a feature that other text-books would do well to copy.

The chief criticism of the book is that it is written almost entirely from a German standpoint. The quotations are chiefly from German authors and the illustrations are derived chiefly from German sources. The only map of the world contained in the book is one illustrating the distribution of pressure. Several pages are given to describing the weather service of Germany; only a paragraph is given to the weather service of the United States. The balloon ascents quoted were those made by the German Aeronautical Society, and no mention is made of modern kite work. Perhaps this was intended by the author, as he was writing chiefly for German readers, but a foreigner misses the broad cosmopolitanism such as is found, for example, in the work of Dr. Hann.

H. H. CLAYTON.

*Who's Who in America.* A Biographical Dictionary of Notable Living Men and Women of the United States. Edited by JOHN W. LEONARD. Chicago, A. N. Marquis and Company. 1901-1902. Pp. xvi + 1304.

The initial edition of this work, published two years ago, made a niche for itself in current literature and a place for itself on the most